Microstructural and electrical characterization of Cu and Fe-doped Mn-Co spinel protective coatings for solid oxide cell interconnects

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Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

CONTROL ID: 2814977

CURRENT SYMPOSIUM: SYMPOSIUM 3: 15th International Symposium on Solid Oxide Fuel Cells (SOFC): Materials, Science and Technology

CURRENT SESSION: Ceramic and metallic interconnects; degradation mechanisms, coatings, accelerated testing and life prediction

PRESENTATION TYPE: Contributed (Oral)

TITLE: Microstructural and electrical characterization of Cu and Fe-doped Mn-Co spinel protective coatings for solid oxide cell interconnects

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ABSTRACT BODY:

Abstract Body: MnCo-based coatingsare considered as one of the best materials to limit chromium evaporation and to reduce corrosion on the oxygen side of the interconnect in solid oxide cells. However, there is a lack of real conditions long term studies, where effects of contact pastes, electrical resistance and oxidation kinetics, are evaluated to assess the overall efficiency of coating protection.

In this work, Mn-Co (un-doped, Fe and Cu-doped) coated metallic interconnect samples are successfully processed by electrophoretic deposition, with an optimized thickness around 10 μm. Suspensions with different amounts of Cu and Fe-doped Mn-Co spinels are optimized to improve the Mn-Co-based coatings in terms of densification and electrical properties.

Structural and compositional modifications in the manganese cobaltite spinel and in the coating properties due to the Cu and Fe doping are reviewed and discussed. EPD coated metallic interconnect samples are tested up to 2500-5000 hours at 800°C under current load, to determine their area specific resistance increase as a result of the growing chromia scale. Oxidation kinetics are periodically evaluated after 1000 hrs. Samples are morphologically analysed by post-mortem SEM-EDS and TEM, to determine the oxide scale thickness, possible new phases formation and to examine for evidence of chromium diffusion.

KEYWORDS: ceramic, coating, microstructure.

Presenter Acknowledgment: I have read and acknowledge the above paragraph

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